

## **Method For The Prioritized Processing Of Information**

### **Cross Reference to Related Applications**

5       The present application is a continuation of  
international application PCT/EP02/01589, filed 14 February,  
2002 and which designated the United States, and claims  
priority to European application 01109969.4, filed 24 April,  
2001, the both of which are herein incorporated by reference.

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### **Background of the Invention**

The invention relates to a method for the prioritized  
processing of information in accordance with the pre-  
characterizing clause of patent claim 1.

15       In EP 0 797 818 B1 a procedure is given for wireless  
communication between central and peripheral units,  
particularly for a traffic control system, that on one hand  
enables bi-directional communication between the  
aforementioned and on the other hand enables direct  
20       communication in the near area between individual peripheral  
units, such as between the buses or between a bus and a fixed  
unit, e.g. traffic light system. This enables the optimum use  
of the scarce frequency resource.

25       With increasing traffic density and the installation of  
additional services, such as situation-dependent passenger  
information systems, the few allocatable radio channels have  
been shown to be bottlenecks with regard to the communication  
of information to be processed according to priority.

30       EP 0 952 565 A2 describes a vehicle communication system  
and a method for dynamic allocation of channels that uses  
distributed base stations to enable communication between a  
number of vehicles and a central station.

The disadvantage is the cost of setting up the base stations and the high complexity of the proposed solution.

### Summary of the Invention

5       An object of this invention is therefore to provide a method that, while retaining the known infrastructure, enables the prioritized processing of information particularly for a traffic control system, without impairing the flow of information.

10       Furthermore, it should be possible to output such information to be processed according to priority from authorized peripheral units only.

      The object is achieved by the measures given in patent claim 1. Advantageous embodiments of the invention are given  
15 in further claims.

      By means of the steps given in patent claim 1, a peripheral unit can correctly process, without a delay, an information unit directly received from a different peripheral unit, without a central unit being involved in  
20 this communication. This makes sure the indication of the departure of a bus on the display unit is cancelled directly on the departure of the particular bus and passengers arriving only very slightly late at the bus stop receive no false information that the bus has apparently yet to arrive.

25       This can also produce the following additional advantages:

- i)    Because  
      the individual peripheral units (11,15) communicate with each other using a different frequency from the  
30       frequency used for communication between at least one central unit (11) and the peripheral units (12,15),

the transmission capacity is not adversely affected during the communication between at least one central unit and the peripheral units.

(Patent claim 2).

5    ii) Because

the individual peripheral units (11,15) communicate with each other using the same frequency as used for communication between at least one central unit (11) and the peripheral units (12,15) but the transmitter power for communication between the individual peripheral units is reduced to an extent that the range is limited to the immediate environment of a peripheral unit, no other infrastructure needs to be installed for communication between the peripheral units and the transmission capacity is thus not adversely affected during the communication between at least one central unit and the peripheral units (patent claim 4).

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iv) Because

the second information unit (INF2) contains a field (COMMAND2) that specifies the type of prioritized processing, it is possible to specify the type of prioritized processing directly from an operating status in the receiving and/or transmitting peripheral unit (patent claim 5).

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#### **Brief Description of the Several Views of the Drawings**

The invention is explained in more detail using drawings as examples. These are as follows.

30    Figure 1    Overview of the communication relationships between a central unit and peripheral units.

Figure 2    Overview of system for implementing the method in accordance with the invention.

### Detailed Description of the Invention

Figure 1 shows at least one central unit 10 that functions as a control center of a traffic system and peripheral units 11 and 12 each of which is allocated to an omnibus, referred to in the following as bus. Furthermore, a further peripheral unit 15 is shown as a display unit at a bus stop.

Communication between the central unit 10 and the peripheral units 11, 12 and 15 takes place using the multiplexing method, with each peripheral unit being allocated a time slot. Additionally, a time slot can be provided that, as a broadcast channel, is commonly available to all communication participants, i.e. all peripheral units 11, 12 and 15 and at least one central unit 10. Information units INF1 are communicated to the peripheral units from the central unit 10. Such information units INF1 are also known as telegrams. An example of the structure of an information unit INF1 of this kind is shown in the following table 1.

Name	Content, examples
..	
DESCRIPTOR	Description of the structure of the information content
INFO11	Display content part 1
INFO12	Display content part 2
KEYCODE1	Key code 1
KEYCODE2	Key code 2
..	

Table 1

The structure of the first information unit INF1 is given in the DESCRIPTOR field, in particular which fields are contained therein and details of the length of this information unit. This presentation shown in table 1 assumes that such an information unit INF1 is communicated to a display unit 15 on the basis of reported local information

regarding a bus 11. The display content is contained in fields INFO11, and perhaps also additionally in a further field INFO12. For example, the sequence of characters "31;15.32; Schlieren" is shown in field INFO11. In this case  
 5   ";" is a separator that separates the content. This display content is shown on display unit 15 itself as indicated in table 2.

Line	Departure	Direction
31	15.32	Schlieren

Table 2

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Together with display content INFO11, an associated key code KEYCODE1 is also transmitted and is buffer stored in the control section of the display unit 15.

An information unit INF1 with a structure comparable to  
 15   that in table 1 is also transmitted from the central control unit 10, e.g. on the basis of reported local information concerning a bus, and is buffer stored in an on-board computer on the bus. In particular, information unit INF1 to a bus contains the identical key code KEYCODE1 that was  
 20   communicated to a display unit, and also the course number in a field COURSE. The key code KEYCODE1 can, for example, be formed from the vehicle number.

From the peripheral unit 11 in bus 21, see figure 2, a  
 25   second information unit INF2 is communicated as shown in table 3.

Name	Content, examples
KEYCODE2	Vehicle number
COMMAND2	Action, instruction, e.g. delete

Table 3

In the field COMMAND2 there can be an instruction, for  
 30   example, to delete the relevant line in the display unit. If

when the second information unit INF2 is received the control section of the display unit 15 detects that the key code KEYCODE2 transmitted in it is identical to the key code KEYCODE1 transmitted previously, the content of the field  
5 COMMAND2 is executed by the control section. This is possible due to the allocation of KEYCODE1 to INFO11, that has resulted in accordance with the transmission of the first information unit INF1. The second information unit INF2 can have a fixed structure, or in the case of the first  
10 information unit INF1 a variable structure. If a variable structure is present, a field DESCRIPTOR2 is additionally provided. The unidirectional communication link shown in Fig. 1 can also be of a bi-directional kind.

Fig. 2 shows a system overview in which the  
15 implementation of the method in accordance with the invention is explained in more detail. A bus stop 26 has at least one display unit 25 on which the imminent departures of buses are shown. One bus 21 has arrived at a bus stop 26. A control center is formed from at least one operator station 20 and a  
20 computer system 23, together with radio transmission equipment including at least one antenna mast 24 that provides radio coverage for one zone of a local traffic operator. It is assumed that a first information unit INF1 has already been transmitted and the key code KEYCODE1  
25 contained in it was buffer stored in the on-board computer. The driver locks the doors immediately before departing. The actuation of the door locking signals the on-board computer to pack the key code KEYCODE1 including a command COMMAND2 in a second information unit INF2, see table 3, and to transmit  
30 it in a time slot provided in the radio transmission interface. This information unit INF2 is received by the control section of display unit 25 and a comparison is carried out to determine whether a key code KEYCODE1 has been previously stored and whether it agrees with the transmitted  
35 key code KEYCODE2. If they agree, the display "31 15.32 Schlieren" is deleted because of the content of the field COMMAND2.

The method in accordance with the invention can also be used for the arrival of a bus at a bus station. For this purpose, the instruction "flashing" is provided in the field COMMAND2. If the aforementioned conditions are complied with  
5 on receipt of the second information unit INF2 in the control section of the display unit 25, the content of the field COMMAND2 has the effect that the departure time information "15.32" is hidden as shown in the illustration in figure 2 and the information Line and Destination is shown flashing.  
10 In this way, the passengers in the area of the bus station are made aware of the immediate departure of the relevant bus.

In the first information unit INF1, it can also be provided in the key code KEYCODE1, or additionally, that  
15 details of the validity or life of the key code be included. For example, that the key code is used up when it has been used once or if a particular command COMMAND2 is used and has no effect in the receiving peripheral unit if transmitted again by means of a further second information unit INF2.

20 The method in accordance with the invention is not confined to communication between a bus 21 and a display unit 25. A particularly advantageous application is the decentralized backup link that is merely initiated by the control center, i.e. by transmission of a first information  
25 unit INF1 to both buses, usually a shuttle vehicle. To back up the link, both buses in the area of the bus stop can communicate directly via second information units INF2, to ensure a connection for the passengers. A suitable display on a control unit allocated to the on-board computer can be used  
30 in this case to assist the driver.

A further use of the method in accordance with the invention is the arrival of buses in a depot. Possible actions in this case are instructions for special vehicle  
35 maintenance or the loading data to the on-board computer from a mass storage unit.

For the wireless transmission of the second information unit INF2, distances in the bus stop area of from a few

meters up to a approximately 100 m are to be traveled. In an advantageous further development of the inventive method, it can be provided that this transmission takes place, for example, in a broadcast channel and thus reduces the

5 transmitter power to an extent that a minimum reception field strength is ensured in the aforementioned bus stop area. In an alternative configuration, a different frequency can also be used and if need be a transmission method standardized for such purposes can also be used. The Bluetooth technology is  
10 particularly suitable for the immediate bus stop area. It is also possible to transmit in the infrared range.

The use of the method in accordance with the invention is not limited to communication for the local traffic area. This method can be used anywhere where a direct temporary  
15 communication is necessary between peripheral units, but this communication should if possible take place without direct control through a central unit. For example, the method in accordance with the invention can be used to realize a  
temporary communication link between individual terminals of  
20 a cellular trunked radio system.